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## <u>Claims</u>

- 1. A nucleic acid molecule encoding a protein which is present in plant cells in starch granule-bound form as well as in soluble form, selected from the group consisting of:
  - (a) nucleic acid molecules encoding a protein with the amino acid sequence indicated in Seq ID No. 2;
  - (b) nucleic acid molecules comprising the coding region of the nucleotide sequence indicated under Seq ID No. 1;
  - (c) nucleic acid molecules hybridizing to the nucleic acid molecules mentioned under (a) or (b);
  - (d) nucleic acid molecules the sequence of which due to the genetic code is degenerated when compared to the sequences of the nucleic acid molecules mentioned under (a) or (b); and
  - (e) fragments, derivatives or allelic variants of the nucleic acid molecules mentioned under (a) to (d).
- 2. A vector containing a nucleic acid molecule of claim 1.
- 3. The vector of claim 2, wherein the nucleic acid molecule is linked to regulatory elements ensuring transcription in eukaryotic and prokaryotic cells.
- 4. A host cell, which is genetically modified with a nucleic acid molecule of claim 1 or with a vector of claim 2 or 3.
- 5. The host cell of claim 4, being a transgenic plant cell.
- 6. A plant containing the plant cells of claim 5.
- 7. Starch obtainable from the plant cells of claim 5 or from a plant of claim 6.
- 8. A method for the production of a protein, which is present in the plant cells in starch granule-bound form as well as in soluble form, in which a host cell of claim 4 is cultivated under conditions allowing for the expression of

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the protein and in which the protein is isolated from the cells and/or the culture medium.

- 9. A protein encoded by a nucleic acid molecule of claim 1 or obtainable by the method of claim 8.
- 10. An antibody specifically recognizing the protein of claim9.
- 11. A nucleic acid molecule with a length of at least 15 nucleotides which specifically hybridizes to a nucleic acid molecule of claim 1.
- 12. A DNA molecule encoding an antisense-RNA complementary to the transcripts of a DNA molecule according to claim 1.
- 13. A DNA molecule encoding an RNA with ribozyme activity which specifically cleaves transcripts of a DNA molecule of claim 1.
- 14. A DNA molecule encoding an RNA which upon expression in a plant cell leads to a reduction of the expression of a nucleic acid molecule of claim 1, due to a cosuppression effect.
- 15. A vector containing a DNA molecule of any one of claims 12 to 14.
- 16. The vector of claim 15, wherein the DNA molecule is combined with regulatory DNA elements ensuring transcription in plant cells.
- 17. A host cell containing a DNA molecule of any one of claims 12 to 14 or a vector of claim 15 or 16.
- 18. A transgenic plant cell containing a DNA molecule of any one of claims 12 to 14 in combination with regulatory DNA elements ensuring transcription in plant cells.

- 19. The transgenic plant cell of claim 18, in which the activity of at least one further enzyme involved in the starch biosynthesis or modification is reduced when compared to non-transformed plants.
- 20. The transgenic plant cell of claim 19 in which the activity of a branching enzyme is reduced.
- 21. The transgenic plant cell of claim 20 in which the activity of a starch granule-bound starch synthase of the isotype I (GBSS I) is reduced.
- 22. A transgenic plant obtainable by regenerating a plant cell of any one of claims 18 to 21.
- 23. Starch obtainable from plant cells of any one of claims 18 to 21 or from plants of claim 22.
- 24. An RNA molecule obtainable by transcription of a DNA molecule of any one of claims 12 to 14.
- 25. A method for the production of transgenic plant cells synthesizing a modified starch characterized in that the amount of proteins of claim 10, which are synthesized in the cells in endogenous form, is reduced in the cells.
- 26. The method of claim 25 characterized in that the reduction of the amount of proteins of claim 10 in the cells is caused by an antisense effect.
- 27. The method of claim 25 characterized in that the reduction of the amount of proteins of claim 10 in the cells is caused by a ribozyme effect.
- 28. The method of claim 25 characterized in that the reduction of the amount of proteins of claim 10 in the cells is caused by a cosupression effect.

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- 29. The method of any one of claims 25 to 28, wherein the enzyme activity of at least one further enzyme involved in the starch biosynthesis and/or modification is reduced.
- 30. The method of claim 29 wherein the enzyme is a branching enzyme.
- 31. The method of claim 29 wherein the enzyme is a starch granule-bound starch synthase of the isotype I (GBSSI).
- 32. A plant cell obtainable by a method of any one of claims 25 to 31.
- 33. A transgenic plant obtainable by regenerating the plant cells of claim 32.
- 34. Starch obtainable from plant cells of claim 32 or a plant of claim 33.
- 35. The starch of claim 34 characterized in that it is derived from potato.
- 36. Propagation material of plants of claim 6 containing plant cells of claim 5.
- 37. The propagation material of plants of claim 22 or 32, containing plant cells of any one of claims 18 to 21 or of claim 32.
- 38. The transgenic plant of claim 22 or 33 which is a potato plant.
- 39. Tuber of a potato plant of claim 38.
- 40. The tuber of claim 39 which in comparison to tubers of wildtype plants exhibits a reduced cold sweetening.